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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/683,927	10/10/2003	Niraj Mahadev	2855/98	2230

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KENYON & KENYON
Suite 700
1500 K. Street, N.W.
Washington, DC 20005

EXAMINER	
CULBERT, ROBERTS P	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 02/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/683,927	Applicant(s) MAHADEV ET AL.	
	Examiner Roberts Culbert	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2005*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.
4a) Of the above claim(s) *21-25* is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-20* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *10 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group II, Claims 1-20 in the reply filed on 11/30/05 is acknowledged.

Claims 21-25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 3-7, 9-15 and 17-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3 and 11 recite the limitation "said metal disk". There is insufficient antecedent basis for this limitation in the claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,897,424 to Evans.

Regarding Claim 1, Evans et al. teach selectively etching (Col. 3, Lines 34-46) a metal lapping plate and imbedding diamond particles into the metal plate. (Col. 1, Lines 10-40 and Col. 6, Lines 1-5)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2-4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler pp. 1-3, "Machining Fundamentals" to J. Walker pp. 511-516.

Evans et al. teaches that it is old in the a metal lapping plate may be machined or etched to form texture or pattern that provides for the retention of polishing media or the accumulation of material removed from the surface.

Regarding the limitation of imbedding diamond particles, Evans et al. teaches that it is known to use abrasive particles in a slurry provided at the interface of the lapping plate and/or to imbed abrasive particles in the substrate surface (Col. 1, Lines 10-40) Evans et al. further teaches suitable polishing abrasives include diamond and silicon carbide (Col. 6, Lines 1-5)

Regarding Claim 2, Evans et al. does not expressly teach etching the pattern by applying a photoresist to the metal plate, selectively exposing areas of the resist to electromagnetic radiation, developing the photoresist, and etching areas of the metal. However the recited steps are notoriously old and well known in the etching art for the purpose of selectively etching a fine pattern in a semiconductor or metal layer. For example, Köhler teaches that the use of photoresist patterning is old and well known in the art of etching patterns in metals. (See last paragraph page 2.) Walker teaches that a metal plate may be selectively etched by coating a photosensitive resist layer (photoresist) exposing to electromagnetic radiation through a mask, developing the resist, etching exposed portions of the metal plate and removing the photoresist.

It would have been obvious to one of ordinary skill in the art at the time of invention to selectively apply a photoresist to the metal plate of Evans et al. in order to selectively protect portions of the metal layer from etchant exposure thereby forming a pattern or texture.

Regarding Claim 3, Evans et al. do not expressly teach embedding particles in non-etched areas of the metal plate. However, it would have been obvious to one of ordinary skill in the art at the time of invention to do since the non-etched areas contact the substrate.

Regarding Claims 4 and 12, Evans et al. teaches providing a mask (negative) between electromagnetic radiation source and photoresist layer. (chemical blanking Step 3 on page 515)

Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler pp. 1-3, and "Machining Fundamentals" to J. Walker pp. 511-516, and in further view of view of Applicant's Admitted Prior Art (APA), U.S. Patent 4,037,367 to Kruse and U.S. Patent 5,509,556 to Balz et al.

Regarding Claims 5 and 13, Evans et al. does not teach a mask is a wire mesh. However, Kruse teaches a mesh pattern. (Figures 6-9) It would have been obvious to one of ordinary skill in the art at the time of invention to use the mesh pattern of Kruse in order to improve bulk removal rates and pole tip recession. (See also APA, Paragraph 10) Kruse does not expressly teach a "wire" mesh. However, it is old and well known in the etching art to use metal material for exposure masks in photolithographic processes. See Balz et al. (Col. 1, Lines 14-28) It would have been obvious to one of ordinary skill in the art at the time of invention to use a metal mask in the shape of a mesh pattern and thereby provide a "wire mesh" in order to provide a mask having suitable strength for small closely spaced features.

Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler pp. 1-3, and "Machining Fundamentals" to J. Walker pp. 511-516, and in further view of U.S. Patent 3,291,738 to Sciambi

Regarding Claims 6 and 14, Evans et al. teaches light exposure but does not expressly teach ultra-violet radiation as the light source. However it is old and well known in the photolithography art to use ultra-violet radiation to cure photoresists. For example, Sciambi teaches that conventional photoresists require ultra-violet light exposure for curing. (Col. 1, Lines 49-51) It would have been obvious to one of ordinary skill in the art at the time of invention to use ultraviolet light in order to cure a selected photoresist in the conventional manner.

Claims 7, 9, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler pp. 1-3, and "Machining Fundamentals" to J. Walker pp. 511-516, and in further view of "Silicon processing for the VLSI Era" to Wolf et al. pp. 407-409 and 529-530.

Regarding Claims 7 and 15, Evans et al. does not teach positive photoresist. However, Wolf et al. teaches both positive and negative photoresist types are commonly used for patterning. It would have been obvious to one of ordinary skill in the art at the time of invention to use a positive resist in order to provide high resolution capability as taught by Wolf.

Regarding Claims 9 and 17, Evans et al. does not expressly teach a wet etch operation. However the advantages of wet etching over dry etching are known in the art. It would have been obvious to one of ordinary skill in the art at the time of invention to use wet etching to perform the etching step of Evans et al. in order to benefit from high selectivity and reliability compared to dry etching as taught by Wolf.

Claims 10, 11 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,897,424 to Evans et al. in view of "Etching in Microsystem Technology" to M. Köhler, and "Machining Fundamentals" to J. Walker pp. 511-516, and in further view of U.S. Patent 4,821,461 to Holmstrand.

Regarding Claims 10 and 18, Evans et al. does not expressly teach the diamond particles have diameter less than 50 nanometers. Holmstrand teaches use of diamond particles having diameter from 1 to ten microinches. (25-254 nanometers) It would have been obvious to one of ordinary skill in the art at the time of invention to use diamond particles having diameter smaller than 50nm in order to provide suitable polishing for a magnetic head as taught by Holmstrand.

Regarding Claims 11 and 19, Evans et al does not expressly teach polishing a GMR read/write head. However, Applicant's Admitted Prior Art teaches that it is known to use a metal lapping plate such having grooves and diamond particles as shown by Kruse and Holmstrand to polish the air-bearing surface of a GMR read/write head. It would have been obvious to one of ordinary skill in the art at the time of invention to use the metal plate of Evans et al. (having etched grooves and diamond particles) to polish the air-bearing surface of a GMR read/write head.

Regarding Claim 20, since the claimed pole tip recession is a result of the claimed lapping method, and the method of Evans et al. in view of Kohler, Walker and Holmstrand teaches the same method limitations (e.g. diamond particle size), the claimed result would be similarly produced, or else arises from essential limitations not present in the claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (571) 272-1433. The examiner can normally be reached on Monday-Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. Culbert
Examiner
Art Unit 1763

Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763